

# **GEOFYSICAL FLUID DYNAMICS LABORATORY**

## **Princeton, New Jersey**

### **Mission**

The mission of the Geophysical Fluid Dynamics Laboratory (GFDL) is to be a world leader for the production of timely and reliable knowledge and assessments on natural climate variability and anthropogenic changes and in the development of the required earth system models. GFDL works cooperatively in the National Oceanic and Atmospheric Administration (NOAA) to advance its expert assessments of changes in national and global climate through research, improved models, and products.

### **Brief History**

GFDL was formed in 1955 as the research branch of the U.S. Weather Bureau in Washington, D.C. In 1968, GFDL moved to Princeton, New Jersey, to pursue collaborative research with Princeton University through a memorandum of understanding (MOU). That arrangement continues to this day. GFDL encompasses a variety of disciplines (e.g., meteorology, oceanography, hydrology, chemistry, biogeochemistry) and focuses on topics of practical value (i.e., hurricane forecasts, El Nino prediction, stratosphere ozone depletion, and global warming). GFDL's research goal is to expand the scientific understanding of the physical, chemical, and biological processes that govern the behavior of the Earth System – with special focus on the developments and utilization of computer simulations.

### **Financial Profile (Dollars in Thousands)**

Fiscal Year	Permanent Funding	Other NOAA	Non- NOAA	Pass Through	<b>TOTAL</b>
FY 2001	13404	8404	483		22291
FY 2002	14817.7	12438	578.1	0	27833.8
FY 2003	19335.4	12212.9	548.1	0	32096.4

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## Princeton, New Jersey

### Personnel Data

FY	FEDERAL EMPLOYEES	JOINT INSTITUTE	Contractors	TOTAL
FY 1999	81	19	6	106
FY 2000	83	25	9	117
FY 2001	81	23	10	114
FY 2002	84	28	22	134
FY 2003	84*	27**	24***	130

\* includes 4 summer students

\*\* includes 2 summer visiting scientists

\*\*\* includes only those JI staff funded under cooperative agreement with GFDL.

Average Age Federal/Scientific/Engineering and Technical Staff	46.6
Average Age of JI/Scientific/Engineering and Technical Staff	38.3

Federal Staff	PhD	31% MS	24%
JI Staff	PhD	61% MS	5%

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## PARTNERSHIPS

(This is a partial accounting of the most significant ones)

PARTNERSHIPS	IDENTIFY (and explain)
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JOINT INSTITUTES	<p>Princeton University - GFDL and Princeton University entered into a memorandum of understanding (MOU) to work on scientific problems of mutual interest in 1967. That MOU was the catalyst that began the Atmospheric and Oceanic Sciences Program within Princeton University's Department of Geosciences and it involved both a post-doctoral visiting scientist component and a teaching component. Over ten GFDL scientists are on the faculty of Princeton University and the AOS program has conferred more than 50 doctoral degrees since its founding 35 years ago. Princeton contributes significantly to the development of GFDL's coupled climate models through the work of the the AOS program and the Princeton Environmental Institute.</p> <p>Columbia University - A Joint Institute was established in late FY2003. Collaborative studies will focus on testing climate models in the context of paleoclimate, improving climate models, and developing climate variability and change applications.</p>
PARTNERSHIPS WITH OTHER LABS	<p>PMEL and AOML - collaborations on observations and models of the oceanic carbon cycle.</p> <p>SEC - development of solar forcing fields for climate models.</p> <p>CDC - collaborations on coupling the GFDL atmosphere model to the NCEP CDAS, forced, regional climate trends to seasonal forecasting, model responses to observed SST changes in 20th century and to projected SST changes in 21st century, seasonal forecasting using short model runs, intercomparison of coupled oceanic mixed layer and atmospheric models.</p> <p>FSL - collaborations on developing applications for use on parallel computer architectures.</p>
OTHER OAR PROGRAMS	<p>OGP – Investigate atmospheric chemistry; ocean data assimilation; land surface predictability; observed climate change in the upper atmosphere; analysis of satellite and radiosonde climate records to document long-term water vapor changes; the warm season durinal cycle over the continental United States and northern Mexico in global atmospheric general circulation models; improving seasonal forecasts; and participation in the climate process teams in CLIVAR.</p> <p>USWRP – Hurricane modeling support.</p>

OTHER NOAA RELATIONSHIPS	<p>NWS - support of the operational use of the Hurricane Forecasting System. Collaborating on the eventual unification of weather and climate models through adopting a common community-wide modeling infrastructure (ESMF) and diagnostics packages to facilitate model intercomparisons, adapt WRF to these community standards, and developing a common modeling repository in which to store shared code.</p> <p>NCDC - collaborating on the delivery of climate model data over the web through a data portal.</p>
OTHER FEDERAL AGENCIES	<p>DOE - GFDL and DOE collaborate on producing climate projections for research and assessment based on emission scenarios developed through the Climate Change Technology Program and an analysis of the climate models' sensitivity, feedbacks, and uncertainty. Participation in ARM.</p> <p>NCAR - entered into a collaborative agreement on climate modeling to support the Climate Change Research Initiative. The goals include accelerating the development of US high-end climate modeling capabilities developing a joint program to provide decision makers with timely, reliable, well-documented model results, model-based analyses, and assessments of climate variability and change. Establish community standards for model diagnostics packages and modeling infrastructures. Collaborate on the development of GFDL's new ice model</p> <p>NASA - Establish community standards for model diagnostics packages and Earth System modeling infrastructures</p> <p>DOD - The Navy uses GFDL's Hurricane Prediction System.</p> <p>NSF - participation in Climate Process Teams, including low-latitude cloud feedbacks on climate sensitivity, gravity current entrainment in oceanic overflows, and eddy-mixed layer interactions in the ocean</p>
STATE AGENCIES	None
LOCAL PARTNERSHIPS	GFDL participates in various educational outreach activities
UNIVERSITY PARTNERSHIPS	<p>Princeton University (see above), University of New Hampshire (collaborating on ecosystem model development for use in coupled Earth System models), Rutgers (collaborations on volcanic forcing, land model development, and paleoclimate), Columbia University/IRI (several collaborations on SI forecasting and ocean data assimilation)</p>

INTERNATIONAL	<p>The IPCC assessment process, various international working groups on climate, and the international ocean modeling community through collaborations on MOM.</p> <p>Collaborations with the UKMO's Hadley Center as part of the European Union's "Ensembles" initiative for climate variability and change forecasting.</p>
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